Comment Response Document for the Phosphorus TMDL for Lake Habeeb, Allegany County, MD

Introduction

The Maryland Department of the Environment (MDE) conducted a public review of the proposed Total Maximum Daily Load (TMDL) for phosphorus entering Lake Habeeb in Allegany County, MD. The public comment period was open from November 8, 1999 through December 10, 1999. MDE received one set of written comments.

Below is a table identifying the commenters, their affiliation, and the date they submitted comments. In the pages that follow, comments are summarized in conjunction with MDE's responses.

List of Commenters

Author	Affiliation	Date
James M Stuhltrager, James Pew, and Jack D. Smith	Widener University School of Law, Environmental and Natural Resources Law Clinic, Wilmington, DE, and Omicron Associates, Inc., Portland, OR; on behalf of Sierra Club and American Littoral Society	December 10, 1999

Comments and Responses

1. The commenters express concern that the Department might have incorrectly applied the dissolved oxygen ("DO") criteria for Use I and Use I-P waters (COMAR 26.08.02.03-3A(2)) instead of the DO criteria for Use III-P waters (COMAR 26.08.02.03(2)(a)).

Response: Citation of "Use I" was a typographical error in the TMDL document, which has been revised accordingly. In developing the TMDL, all calculations for the TMDL applied the correct criteria values for DO for Use III-P waters.

2. The proposed TMDL fails to establish a total maximum *daily* load.

Response: The Code of federal Regulations (40 CFR 130.2(i)) states that "TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measure." No explicit time period is required.

In this case, annual loads are more appropriate than daily loads. From a technical standpoint, nutrient loads from nonpoint sources are highly variable. Most of the loads are generated during a small number of storm events. Thus, it is essentially infeasible to establish a meaningful daily load for nutrients particularly in watersheds, like Lake Habeeb, that are dominated by nonpoint sources. To do so, in view of the large daily variability, would require the daily loading cap to be very large to accommodate the large natural peak loading events. More importantly, nutrients do not have an impact on the temporal scale of a day; rather, they act over long periods of time. For these reasons, the Department has elected to establish the phosphorus TMDL for Lake Habeeb as an annual load. Nevertheless, in order to assist the reader in understanding the magnitude of the loads involved, the TMDL is expressed within the TMDL documentation both as an annual load and an average daily load.

3. The commenters express the concern that the proposed TMDL for Lake Habeeb does not account for seasonal variations.

Response: Seasonal variations involve changes in stream flow as a result of hydrological and climatological patterns. In the continental United States, seasonal high flow normally occurs during the colder period of winter and in early spring from snowmelt and spring rains, while seasonal low flow typically occurs during the warmer summer and early fall drought periods[1]. Given the use of conservative assumptions associated with the critical season, EPA has determined that "load allocations on a yearly basis will effectively consider seasonal environmental variations."[2]

4. The commenters believe that Maryland has made an erroneous determination of the allowable phosphorus loading, and that the correct allowable phosphorus loading should be no greater than 0.32 g/m2 –yr (ca. 595 lb/yr). The current estimated phosphorus loading of 1,095 lb/yr would need to be reduced by about 51%, instead of the 24% that is proposed in the Draft TMDL document.

Response: Figure 5 of the TMDL Report is a representation of the Vollenweider Relationship showing the allowable phosphorus load. Vollenweider's diagram categorizes lakes into three trophic states on the basis of the log-log relationship between areal P loading and q_s (mean depth of the lake divided by hydraulic residence time). Because Maryland's interim interpretation of the dissolved oxygen criteria for stratified lakes categorize lakes into two additional interim states (meso-eutrophic and oligo-mesotrophic), it is necessary to subdivide the mesotrophic portion of Vollenweider's diagram.

The mesotrophic range depicted by Vollenweider was partitioned, from bottom to top, into three sub-ranges: oligo-mesotrophic, mesotrophic, and meso-eutrophic lakes. The upper boundary of the lowest of these three subdivisions (oligo-mesotrophic) was used as the threshold for the TMDL analysis. Thus, the oligo-mesotrophic range for Lake Habeeb lies within 0.35 – 0.50 $g/m^2/yr$. The phosphorus TMDL is set at 0.50 $g/m^2/yr$. The Appendix in the TMDL document has been revised to clarify this matter.

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1 Section 2.3.3 of the Technical Guidance Manual for Developing Total Maximum Daily Loads, Book 2, Part 1 (EPA 823-B-97-002, 1997)

2 Approval Letter from EPA to Maryland Department of the Environment, Regarding Urieville Lake TMDL, August 24, 1999.

5. In calculating the limiting nutrient, the department first averaged the nitrogen and phosphorus concentrations from data collected monthly from March to July 1999, then calculated the ratio of N:P. The commenters question the use of average concentrations in calculating this ratio, because the concentrations of nitrogen and phosphorus vary monthly.

Response: Each of the monthly samples reported in the TMDL document represent instantaneous measurements, subject to potentially significant variability. Technical guidelines, developed by EPA, stipulate that data used to determine the N:P ratio should represent average loading conditions over time to avoid transient phosphorus loading pulses that would give misleading results.

6. The TMDL fails to allocate phosphorus loadings to the various non-point sources of phosphorus listed in Table 1 of the technical memorandum. The proposed TMDL also fails to link any allocation of TMDL loads to the implementation programs currently in process. It is the task of the TMDL process to conduct these tradeoffs and to provide the necessary allocations of loadings to individual sources. The mechanism or regulatory activity outside of the TMDL that would develop the missing allocations is not specified in this technical memorandum, or anywhere else in the draft TMDL document.

Response: The calculated NPS allocation is by definition the sum of the individual load allocations. The sub-allocation of the allowable NPS load is a detailed implementation issue that is beyond the scope of this TMDL. A technical memorandum, entitled *Significant Nutrient Nonpoint Sources in the Lake Habeeb Watershed*, describes viable individual allocations to each land use category and is intended to facilitate future stakeholder dialogue on implementation planning. Please also see the response to Comment # 7 regarding implementation.

7. The commenters express concern that the TMDL provides insufficient detail about how the three programs mentioned in the TMDL document— the Water Quality Improvement Act of 1998 (WQIA), the Clean Water Action Plan (CWAP), and the Tributary Strategies program—will meet the TMDL goal.

Response: Neither the Clean Water Act nor EPA regulations require states to develop a detailed implementation plan as part of the TMDL development and approval process. Maryland's rationale for not including a detailed implementation plan within the TMDL documentation is to allow flexibility for those other government programs and stakeholders currently developing mechanisms to reduce nutrient and sediment loads to Lake Habeeb and other waters of the state.

8. The commenters express concern over MDE's decision to manage Lake Habeeb at an oligo-mesotrophic status, and also question MDE's interim interpretation of the dissolved oxygen criterion as applied to thermally stratified lakes.

Response: MDE recognizes and appreciates the difficult nature of determining "natural" conditions in an artificial impoundment. However, the provision in COMAR 26.08.02.03.A(2)(b) states that the water quality goal "…is not required to be substantially different from that which *would* occur naturally [emphasis added]."

The degree and extent of oxygen depletion is related to a lake's trophic status. Thus, the first step in determining an expected vertical dissolved oxygen profile in a thermally stratified lake (natural or man-made) is to determine an appropriate trophic status. A particular trophic status is neither inherently "good" nor "bad," but rather the description of a lake's condition over a period of time. The natural evolution of all lakes is toward eutrophy, and the trophic status of a particular lake is not static over the long term. For the purposes of the interim interpretation of the dissolved oxygen standard, Maryland has adopted the characterization of Lake Habeeb as oligo-mesotrophic, previously determined by the Maryland Department of Natural Resources in 1994.[3]

Even the most pristine natural lakes, during periods of thermal stratification, exhibit varying DO concentrations with depth. This occurs as a result of natural biological and physical processes, and is a function of depth, temperature, light penetration, mixing, and organic matter in the sediment at the bottom of the lake.

MDE has followed the established methodology of Chapra (1997) in stipulating the 56% DO saturation goal in the sub-epilimnetic waters of a lake of this trophic status. Low DO conditions can, would, and do occur naturally in stratified lakes of meso-eutrophic status. Thus, MDE interprets this condition as "that which *would* occur naturally" in Lake Habeeb.

9. The commenters point out several discrepancies between the water quality characterization for Lake Habeeb in Section 2.2 of the Draft TMDL document and data reported in Appendix A.

Response: The discrepancies have been noted and reconciled. The information was of a historical, descriptive nature and does not affect the TMDL analysis.

10. The Department fails to provide a rationale for selecting 10% as the margin of safety.

Response: There are no explicit guidelines or methodology provided by the EPA for selecting a margin of safety (MOS). The selection of 10% as the MOS was based on other TMDLs approved by the EPA, and was made in consideration of the variability surrounding non-point source pollution as well as the empirical nature of the Vollenweider Relationship. This choice was made with the understanding that the TMDL, and MOS, may be revised in the future as better information becomes available.

3 Maryland Department of Natural Resources, Maryland Lake Water Assessment Report, March 1998.